



**A12/16/24R/U-FS
A12/16/24R/U-SS
Quick Start Guide**

ExaRAID SYSTEM USER'S GUIDE



A12/16/24R/U-FS A12/16/24R/U-SS Quick Start Guide

42-33000-5028



ExaRAID SYSTEM

Version:1.1



Accusys RAID System Task List

Step 1. Unpacking the Accusys RAID System.

Step 2. Installing Disk Drives.

Step 3. System Connections and Management.

Step 4. Setting Up LAN Connections.

Step 5. Connecting the Power.

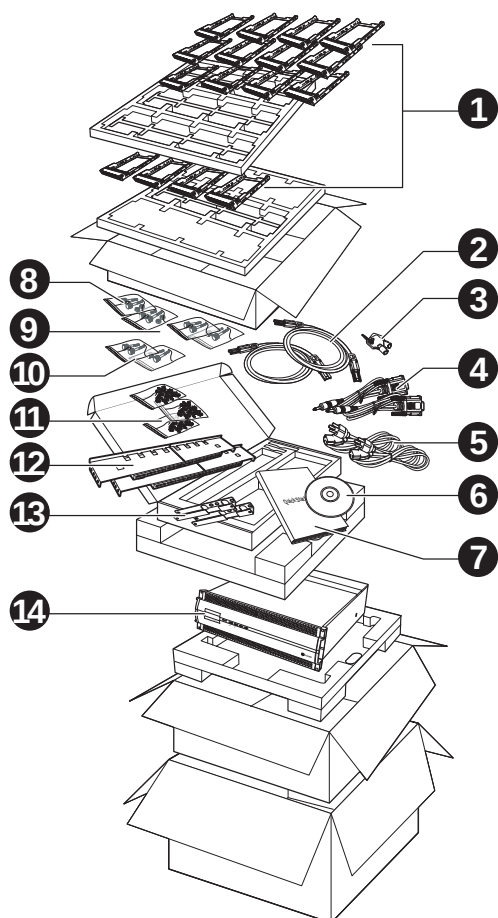
Step 6. Setting the RAID IP Address.

Step 7. Disk Array Configuration.

Step 8. Host Configuration.

Step 1. Unpacking the Accusys RAID System

The box contains the following items:



1. Hard disk tray: A12R/U-FS&SS x 12
A16R/U-FS&SS x 16
A24R/U-FS&SS x 24
2. External SAS (For SAS controllers only)
3. Front panel key x 2
4. RS-232 cable x 2
5. Power cable: A12/16R/U-FS&SS x 2
A24R/U-FS&SS x 3
6. CD x 1
7. User manuals
8. M5 fix screw x 2 packs
9. M6 fix screw x 2 packs
10. UNC # 10-32 fix screw x 2 packs
11. Screw pack
12. Rail x 1 set
13. Rail extender x 1 set
14. RAID system

Step 2. Installing Disk Drives

Installing the Hard Disks

The RAID system supports SAS or SATA interface hard drives.

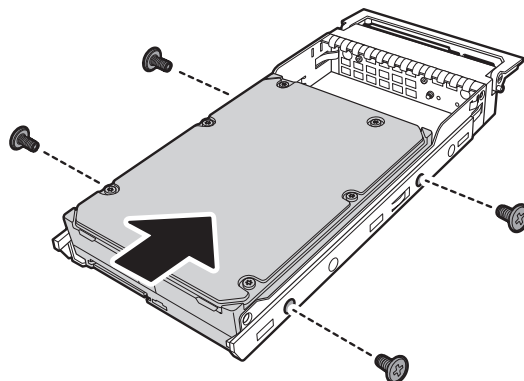


CAUTION

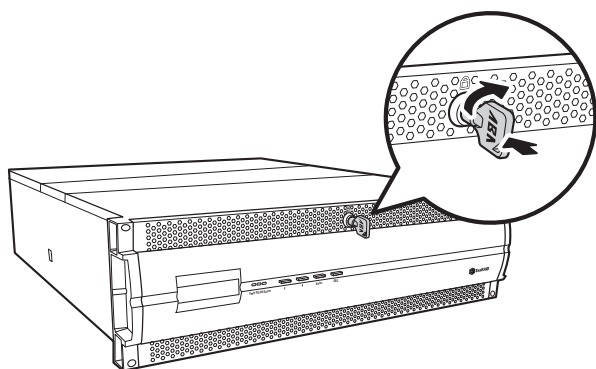
It is recommended to mount the RAID system to the rack cabinet first before installing the hard drives and the drive trays. If the hard drives are installed first, the RAID system may be too heavy to lift or handle. And the possible impact during installation may damage the drives.

Follow the procedures below to install hard drives:

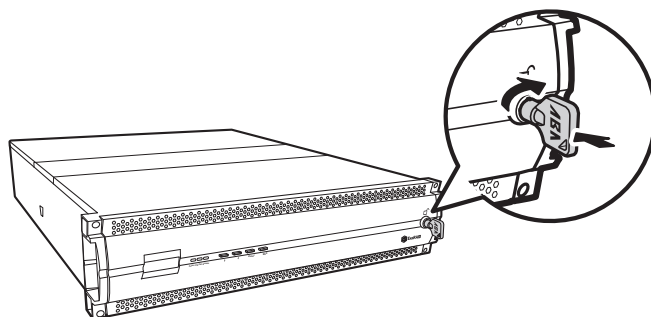
1. Insert the SAS hard drive into the hard disk tray. Screw the sides to secure the hard disk. Repeat this procedure to install more hard disks.



2. Insert the key to the key slot and turn to unlock the front panel door.

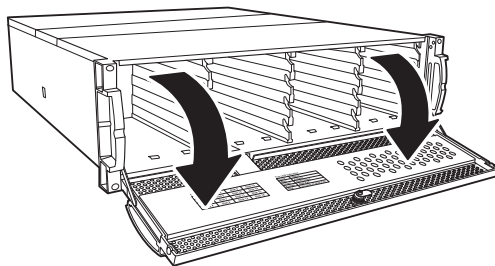


A16R/U-FS&SS

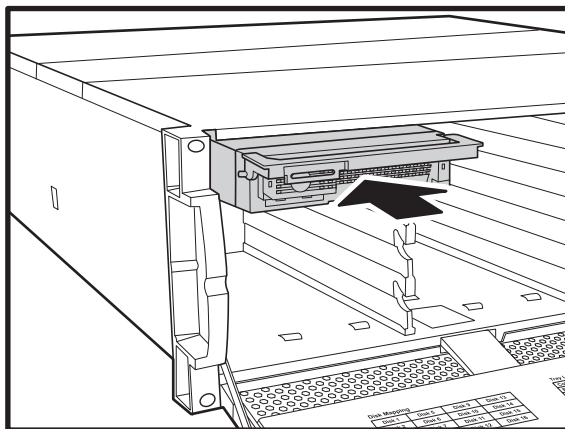


A12/24R/U-FS&SS

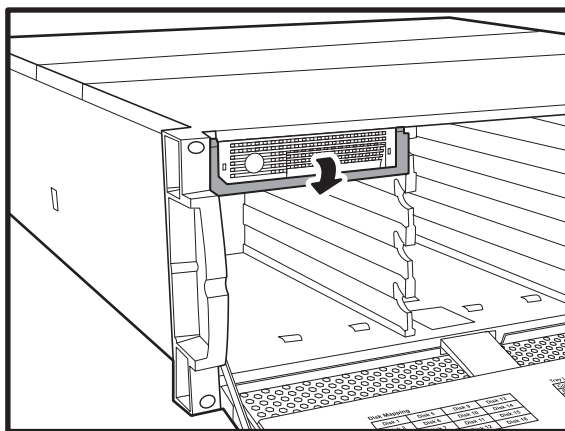
3. Pull open the front panel door.



4. Insert the hard disk trays into the empty slots.

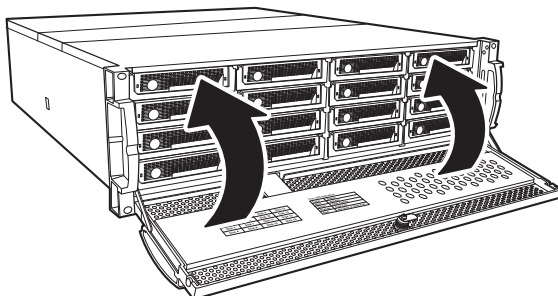


5. Push down the tray handle to secure the hard disk tray into place.



6. Repeat steps 4 to 5 until all the required disks have been installed.

7. Close the front panel door, then lock it.



SATA hard disks

SATA hard drive installation requires an AA-MUX adapter to be installed on the hard disk tray first before installing the SATA hard disk.

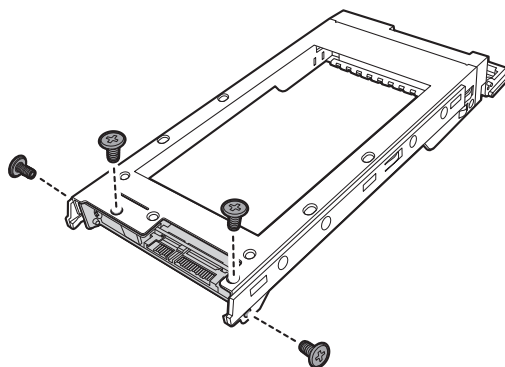


NOTE

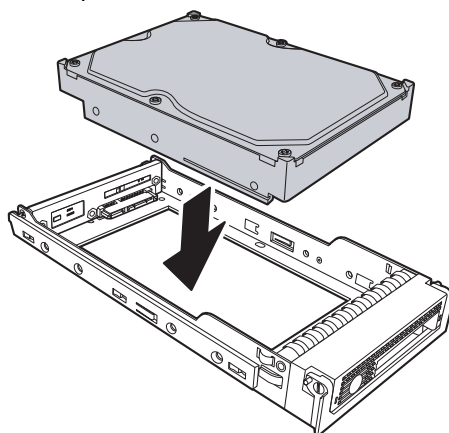
AA-MUX is an optional accessory and is sold separately. Contact your supplier to purchase one.

Follow the procedures below to install SATA hard disks:

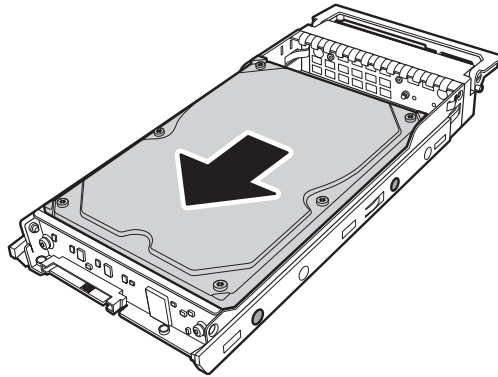
1. Place the AA-MUX adapter on the hard disk tray and attach the four screws as shown.



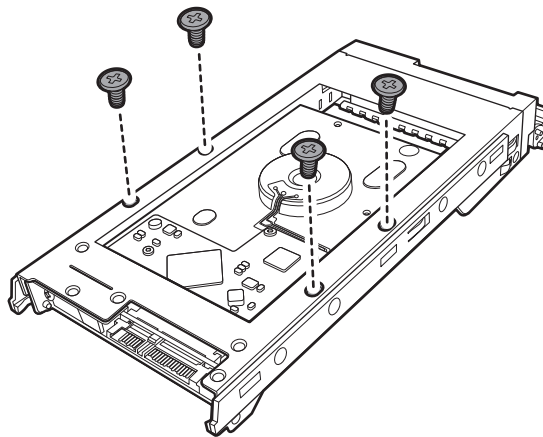
2. Place the hard disk into the hard disk tray with the drive connectors facing the AA-MUX adapter.



3. Slide the hard disk towards the AA-MUX adapter and connect the power and data connectors.



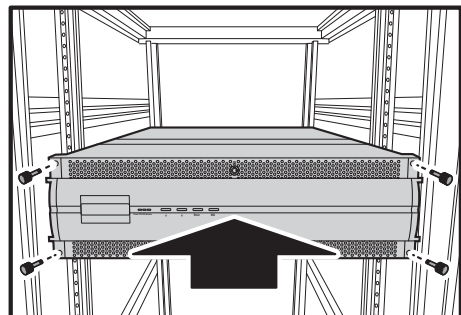
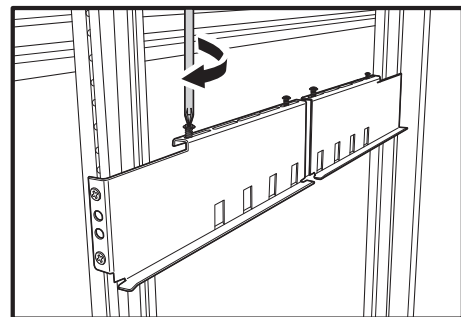
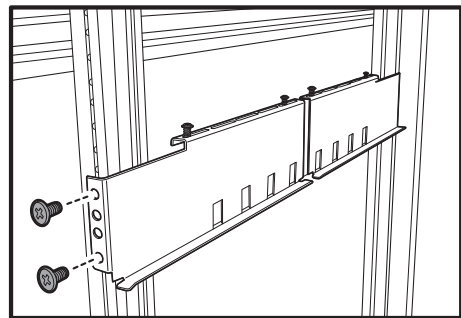
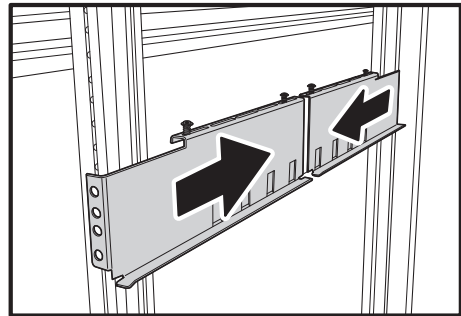
4. Attach the screws to secure the hard disk.



Mounting the RAID system

The RAID system/Rail Extenders can be installed in a standard 19-inch rack. Follow the procedures below:

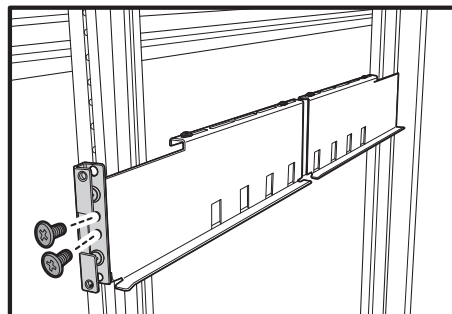
1. Attack eight rack nuts into the rack, making sure that they correspond with the mounting points on the rails.
2. Adjust the length of the rails as needed.
3. Secure the rails using two nuts and bolts on both the front and back posts of the rack then tighten the locking screws.
4. When necessary, install the rail extenders by attaching the screws to secure them.
5. Slide the RAID system into the rack and secure it into place using the fixing screws.



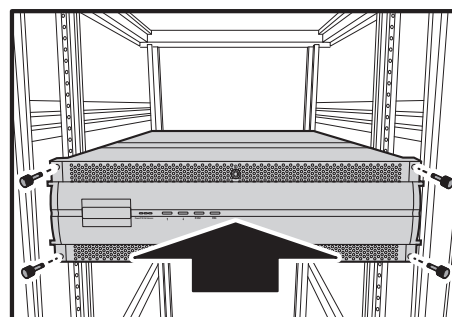
Installing the Rail Extenders

Follow the procedures below to install the rail extenders:

1. Install the rail extenders and attach the screws to secure them.



2. Slide the RAID system into the rack and secure it into place using the fixing screws.



Step 3. System Connections and Management

Connecting to the Host

Connecting Fiber RAID System Controller to the Host

A12R/U-FS, A16R/U-FS, and A24R/U-FS have dual 4G fiber channel interfaces on each controller. Each channel interface can be connected using an optical or copper transceivers and cables.

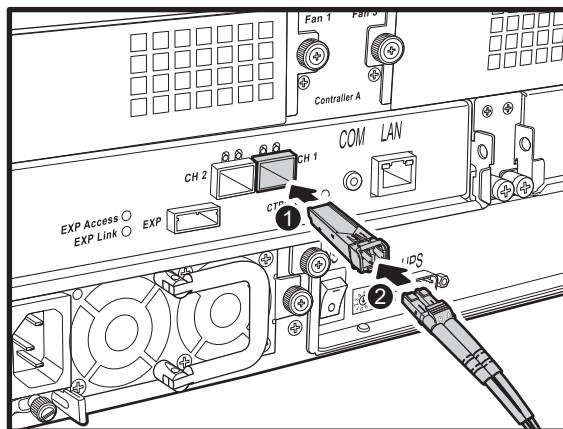
To connect an optical cable, simply insert the cable to the CH1 port.

You can configure your RAID system for:

- Storage Area Network (SAN)
- Direct Attached Storage (DAS)
- JBOD Expansion using a SAS data connection

To connect an LC optical SFP transceiver, follow the procedures below:

1. Insert the SFP transceiver into the CH1 port.
2. Then connect the optical cable to the SFP transceiver.



3. Connect the other end of the optical cable to the HBA connector of the host server.

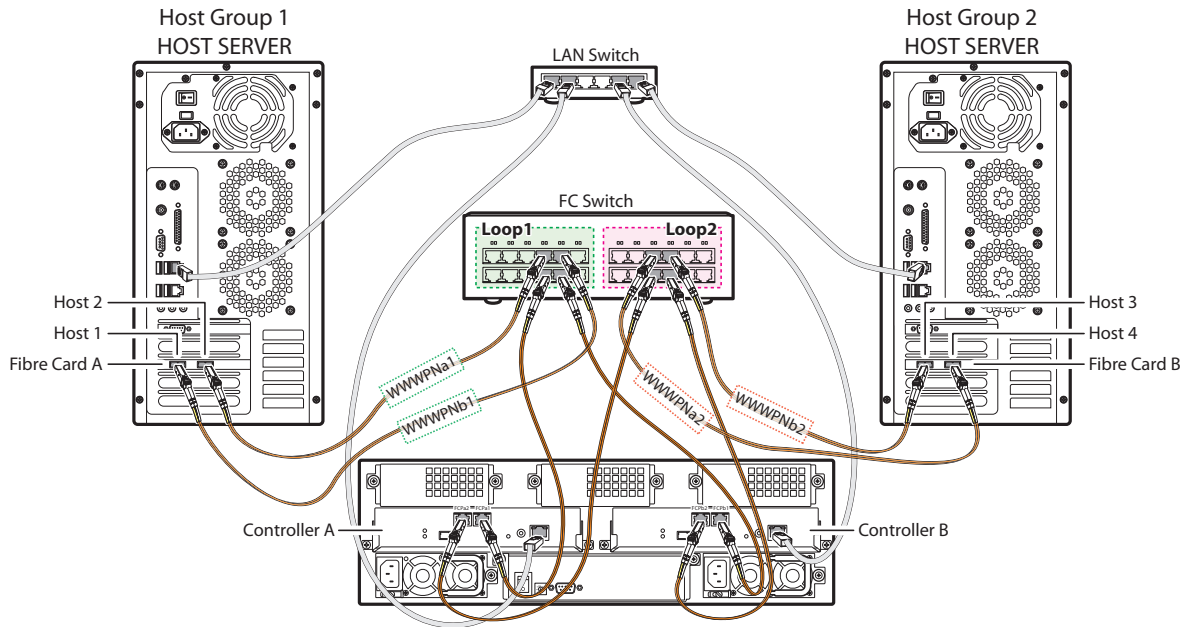
Configuring a Storage Area Network

A storage area network (SAN) requires:

- A Fibre Channel switch
- A Fibre Channel HBA card in each Host PC/Server
- A network switch
- A network interface card (NIC) in each Host PC/Server

To establish the data path:

1. Connect one of the Fibre Channel data ports on the RAID system's controller to your Fibre Channel switch.
2. Connect each Host PC's or Server's standard NIC to your network switch.



Configuring Direct Attached Storage

Direct attached storage (DAS) requires:

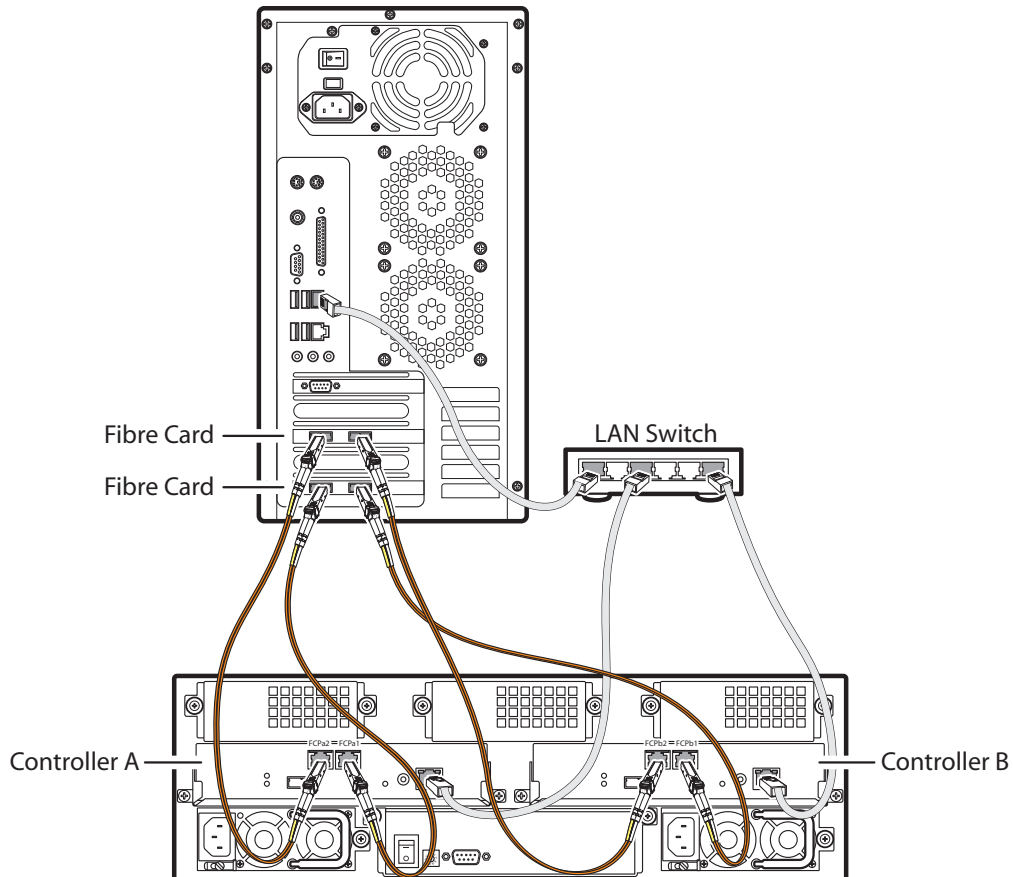
- Two Fibre Channel HBA cards in the Host PC or Server
- A network switch
- A network interface card (NIC) in the Host PC or Server

To establish the data path:

Connect one of the Fibre Channel data ports on the RAID system controller to your Fibre Channel switch.

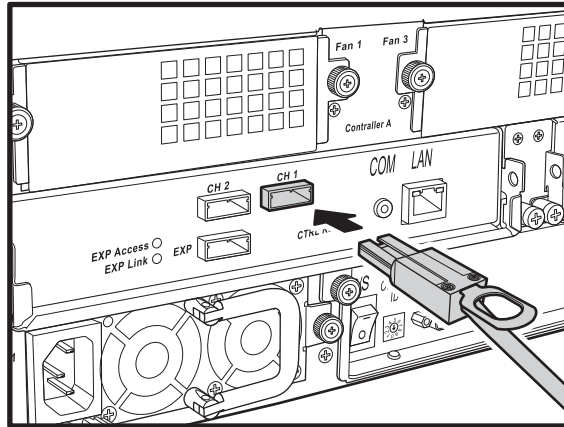
To establish the management path:

1. Connect the Management port on the RAID system controller to your network switch.
2. Connect the Host PC's or Server's standard NIC to your network switch.



Connecting SAS RAID System Controller to the Host (SAS HBA Card required)

1. Insert the SAS cable into the CH1 port.



2. Insert the other end to the HBA connector of the host server.



NOTE

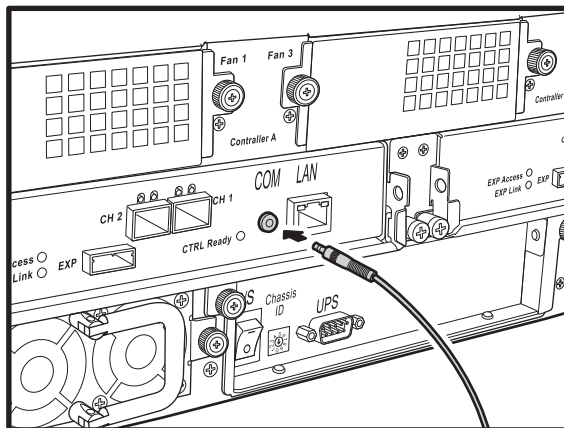
The illustration above shows A16R-SS. Same procedures apply to A12R/U-FS&SS, A16R/U-FS, and A24R/U-FS&SS.

Connecting the CLI Management Port

The RAID system can be managed using the CLI.

To connect the CLI port, follow the procedures below:

1. Insert the RS-232 cable into the COM port.



A16R-FS COM port connection

2. Insert the other end to the computer's COM port.



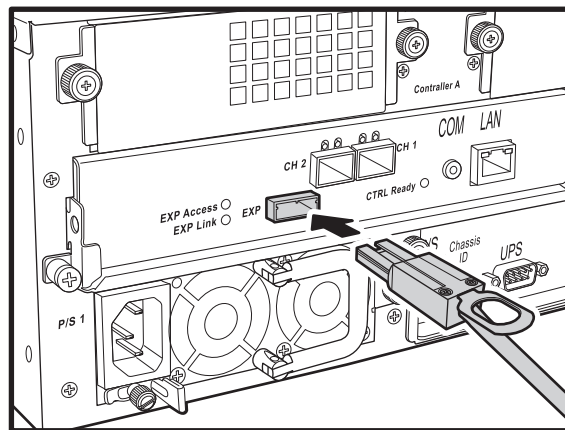
NOTE

- Same procedures apply to A12R/U-FS&SS, A16R/U-SS, and A24R/U-FS&SS.
- Please refer to the software user manual for more information on CLI management.

Connecting JBOD (Sold separately)

Follow the procedures below to connect to A12R/U-SJ, A16R/U-SJ, or A24R/U-SJ (JBOD).

1. Insert a SAS connector to the EXP port on the controller.



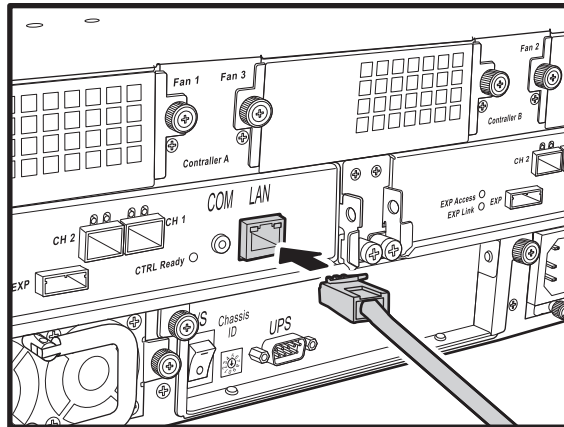
JBOD expansion on A16R-FS

2. Connect the other end to the CH1 port of the JBOD system.
3. Power/Fan/Temp/HDD LED on JBOD lights up green and IO1&2 LED flashes when the connections are set up properly.

Step 4. Setting Up LAN Connections

LAN communication enables the Command Line Interface (CLI) and Graphic User Interface (GUI) on your PC to monitor and control the RAID system to easily monitor and configure the RAID system.

A LAN/WAN connection is required. Follow the procedures below:



To set up a LAN cable connection:

1. Attach one end of the ethernet cable to the LAN port on one of the Controller board.
2. Attach the other end of the ethernet cable to a LAN switch or directly to a LAN port on the Host PC or Server using a crossover cable.

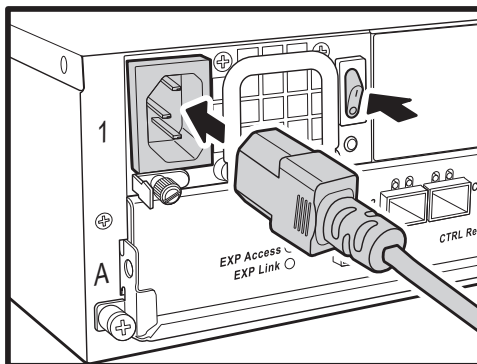
Step 5. Connecting the Power

Once all of the components have been installed into the RAID system, and the management interfaces have been connected, the RAID system can now be powered on.

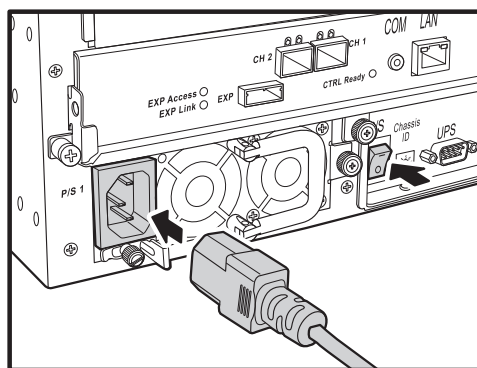
Power on:

1. Plug one power cable into the AC power port.

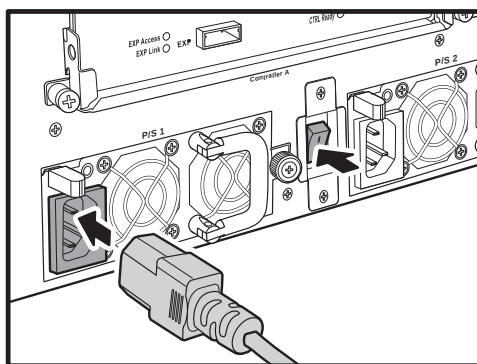
A12R/U



A16R/U



A24R/U



2. Plug the second power cable into the other AC power port.
3. Turn on the power switch.

Power off:

Before you power off the system, make sure all the running process are completed on the host computer.

Please follow the following procedure to shut down your system properly.

By LCD

1. Log in from the LCD panel by inputting the password. The default password is "0000". See **Set up through LCD on page 16** for instructions on using the LCD panel.
2. Select **System Setup > Shutdown > Yes** to power off the system.

By GUI

1. Open a browser and enter the RAID system's IP address in the address field. (The default IP address is 192.168.0.1)
2. Log in from GUI to open the Config Mode. The default username and password are "admin" and "0000".
3. Click **System Management > Restart/Halt** to open the Restart/Halt page.
4. Select **Both Controllers** from the Controller ID drop down menu and select **Halt** from the Action drop down menu and click **Apply**.
5. Click **Confirm** to confirm and shut down the system.
6. Turn the power off when the LCD displays "Ready to power off!".

Step 6. Setting the RAID IP Address

Choosing DHCP or a Static IP Address

When you setup your RAID system, you have the option of:

- Enabling DHCP and letting your DHCP server assign the IP address to the

RAID system's virtual management port.

- Specifying a static IP address for the RAID system's virtual management port.

If you choose to enable DHCP, have your Network Administrator dedicate an IP address for the RAID system, linked to the RAID system's GUI.

Set up through LCD

The RAID system has a front LCD panel which supports a quick configuration and RAID monitoring. You can use the four buttons on the LCD panel to manipulate the LCD configuration utility.

- **UP/DOWN:** Use to select the numbers 0 to 9, characters "a" to "z", or scroll through menu items.
- **Enter:** Use to enter the selected character, confirm the password if no character is selected, or select items in the menu.
- **ESC:** Backspace, or go back to the previous screen.

To set up the IP Address through LCD:

1. Power on the RAID system and wait for the boot up to complete.
2. Input the password using the four buttons to enter the menu. The default password is "0000".
3. Go to **Ethernet Setup** in the menu and select the Controller (**CTL A** or **CTL B**) you want to configure.
4. Select **Set DHCP** and select **Static IP** or **DHCP** depending on your server settings.
5. Input the necessary information such as IP address, net mask, gateway, and DNS.

6. Go to **System Setup > Save Config > Save to NVRAM > YES** in the menu to save your settings.



NOTE

When LAN or WAN is not available, use a HUB or crossover LAN cables to connect to a computer to setup IP then manage the RAID system by GUI. Set the IP as follows:

Controller A LAN = 192.168.1.1

Controller B LAN = 192.168.0.1

Set up through CLI

The Command Line Interface (CLI) is a set of commands which allows users to configure or monitor the RAID system by entering lines of text through a variety of the terminal consoles.

The embedded CLI can be accessed remotely by the Ethernet (TCP/IP) and locally by the RS232 terminal. And by Ethernet, you may use Telnet and SSH (Secure Shell).

Telnet client software is available for all operating systems, and you can download the SSH client software from the following web sites:

SSHWinClient: <http://www.ssh.com/>

PuTTY: <http://www.chiark.greenend.org.uk/~sgtatham/putty/>

To set up the IP Address through CLI:

1. Establish LAN communications with the RAID controller. See Step 4. Setting Up LAN Connections on page 13 for more details.
2. Open your terminal program and log in to CLI using the following information:
 - User name: admin
 - Password: 0000
3. Use the following command to set up the IP address.

Command	ethsetaddr
Synopsis	ethsetaddr ethx method [-a] ip_addr [-s] net_mask [-g] gw_addr [-d] dns_addr [-z] on/off
Description	Set IP address of an Ethernet port
Parameters	method : static or dhcp [-a]: network address [-s]: network mask [-g]: gateway address [-d]: DNS server address [-z]: Automatic Private IP Addressing (APIPA)

For example:

Controller A

```
CLI> ethsetaddr etha1 static -a 192.168.0.1 -s 255.255.255.0 -g  
192.168.0.1 -d 192.168.10.1
```

Controller B

```
CLI> ethsetaddr ethb1 static -a 192.168.0.2 -s 255.255.255.0 -g  
192.168.0.1 -d 192.168.10.1
```



NOTE

Please refer to the software user manual for more information on the set up.

Step 7. Disk Array Configuration

Quick Setup



NOTE

Quick setup can be completed using the LCD or GUI. Please refer to the following settings for reference.

To perform quick setup, all hard disks must be on-line and unused. For an easy configuration, users can specify the RAID level, number of spare disks, and initialization option. Refer to the table below for details of each option.

HDD Information	Shows the number and the minimum size of hard disks.
RAID Level	RAID 0 / RAID 3 / RAID 5 / RAID 6 / RAID 10 / RAID 30 / RAID 50 / RAID 60
Spare Disks	Select the required number of global spare disks.
Initialization Option	Background: The controller starts a background task to initialize the logical disk by synchronizing the data stored on the member disks of the logical disk. This option is only available for logical disks with parity-based and mirroring-based RAID levels. The logical disk can be accessed immediately after it is created. Noinit: No initialization process, and the logical disk can be accessed immediately after it is created. There is no fault-tolerance capability even for parity-based RAID levels.

Two volumes (for raid30, raid50, or raid60) or two logical disks (for other RAID levels) will be created with the capacity of all disks in the RAID enclosure. One volume will be based on two disk groups, so there will be four disk groups in total. The preferred controller of one volume or logical disk is assigned to controller A and the other is assigned to controller B. They will be mapped to LUN 0 and LUN 1 of all host ports on both controllers. All other configurations will remain unchanged, and all RAID parameters will use the default values.

To set up through GUI

1. Select **Quick Setup > Raid Setup**.
2. Select the related settings as follows:
 - RAID Level = RAID5
 - Spare Disks = 0
 - Initialization Option: Background
3. Click **Apply** to start assigning the first 8 hard disks to DG0 and the last 8 hard disks to DG1.
4. Create the logical disk for both disk groups.
5. After creating the logical disk, LUN mapping will automatically be done.

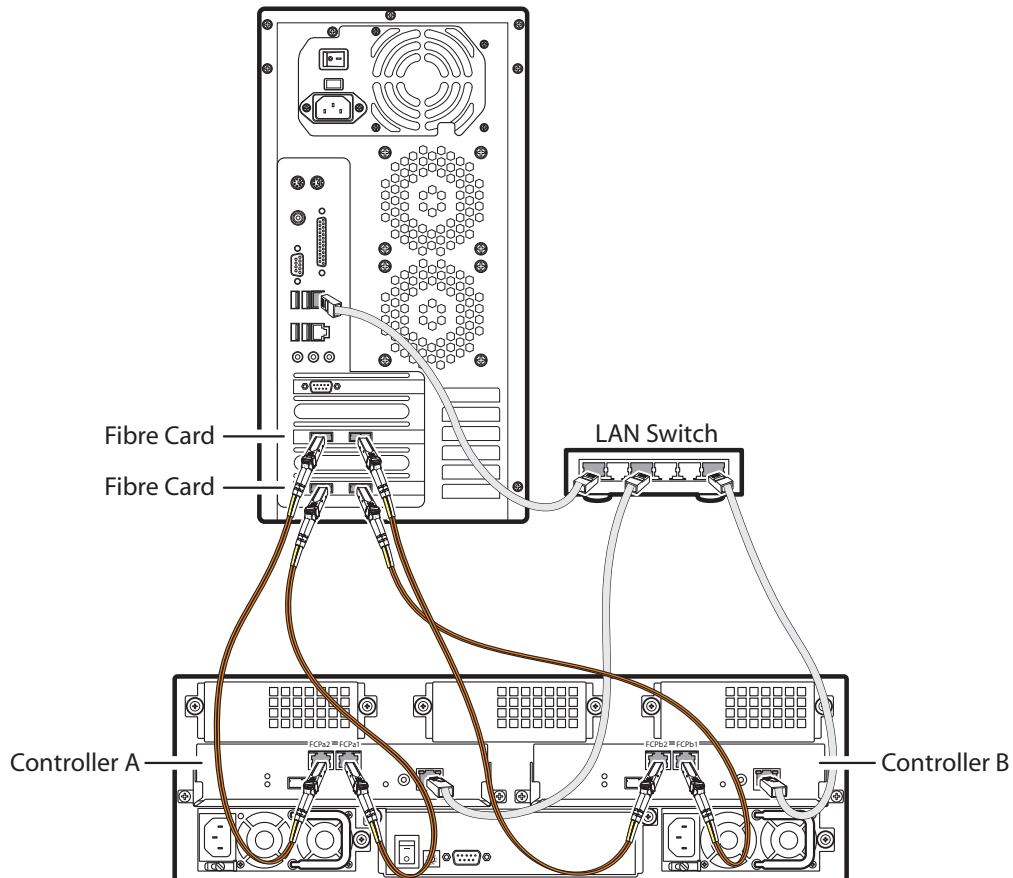
To setup through LCD

1. Enter the password. The default password is "0000".
2. From the main menu, select **Quick Setup**.
3. Select the related settings as follows:
 - RAID Level = 5
 - Spare Disks = 0
 - Init Method: Background
4. The LCD will display the message "Quick setup OK" to indicate setup has been carried out.

Simple storage

Simple storage is used in direct attached storage (DAS) environments.

Any computer is allowed to access the LUNs presented by the controller after gaining access to the host ports of the controller. LUNs are assigned to each virtual disk in the RAID so the host can address and access the data in those devices. Follow the steps below to configure simple storage



Task List for Creating DAS

- A. Create Disk Groups
- B. Create Logical Disks
- C. LUN Mapping

A. Create Disk Groups

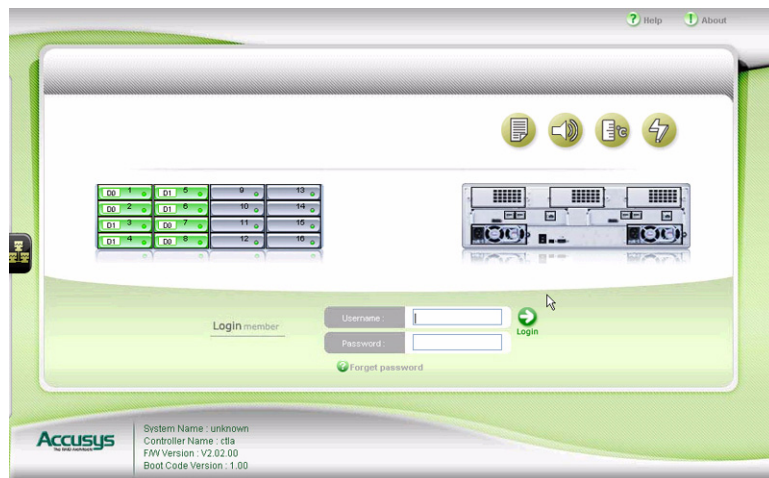
By GUI

1. Open a browser and enter the IP address in the address field. (The default IP address is 192.168.0.1)

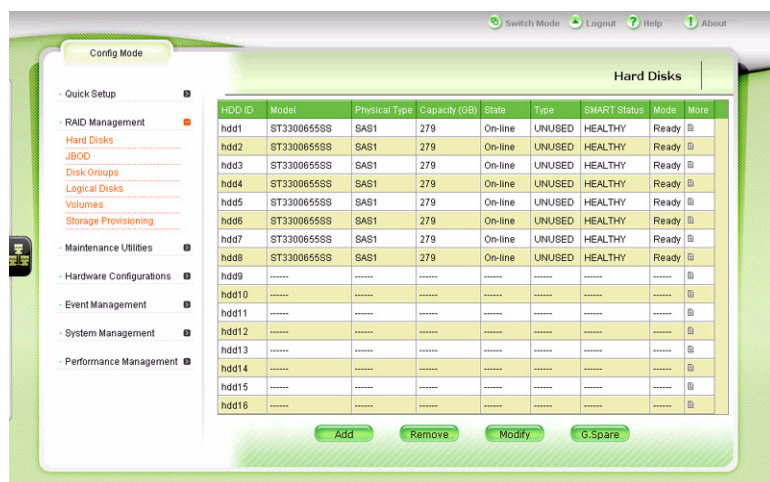
The supported browsers are listed as below:

- IE 6.x (Windows)
- IE 7.x (Windows)
- FireFox 1.x (Windows, Linux, and Mac)
- Safari 1.x and 2.x (Mac)

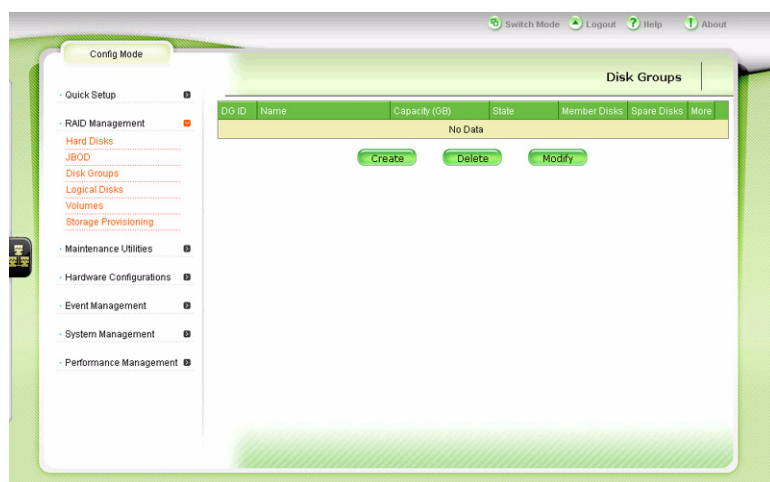
2. The following web page appears when the connection is made. To login, enter the username and password. The default username and password are "admin" and "0000". You can then access the Config Mode.



- To make sure the hard disks are unused, click **RAID Management** from the Config Mode menu to check the status.

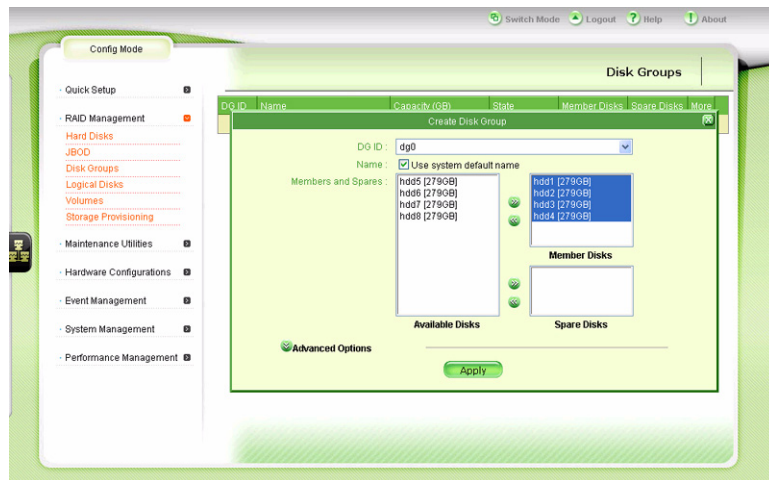


- Click **Disk Groups** from the Config Mode menu. The following screen appears.



- Click **Create** to open Create Disk Group screen.
- Select a DG ID from the drop-down menu.
- Use the system default name as dgx. 'x' is the DG identifier. Or Uncheck the 'Use system default name' box and enter the name in the Name field. The maximum name length is 63 bytes.

8. Highlight the disks to be grouped in **Members and Spares** and click  to move them to the **Member Disks**.



9. Click **Apply** to create the disk group.
10. Repeat steps 4 to 9 to create other disk groups.

By CLI

Disk Groups can also be created from CLI.

1. At the CLI prompt type in: **hddlist all** to check the status of the hard disk and make sure they are unused.
2. Use the following command to create Disk Groups.

Command	dgcreate
Synopsis	dgcreate dgi hddx hddy ... [-n name] [-i par/seq] [-z] [-s hddz,hdda, ...] [-t capacity]
Description	Create a disk group with member disks
Parameters	[-n name]: the name of a disk group [-i par/seq]: logical disk initialization mode (parallel or sequential) [-z]: write-zero immediately [-s hddz,hdda, ...]: local spare disks [-t capacity]: capacity to truncate

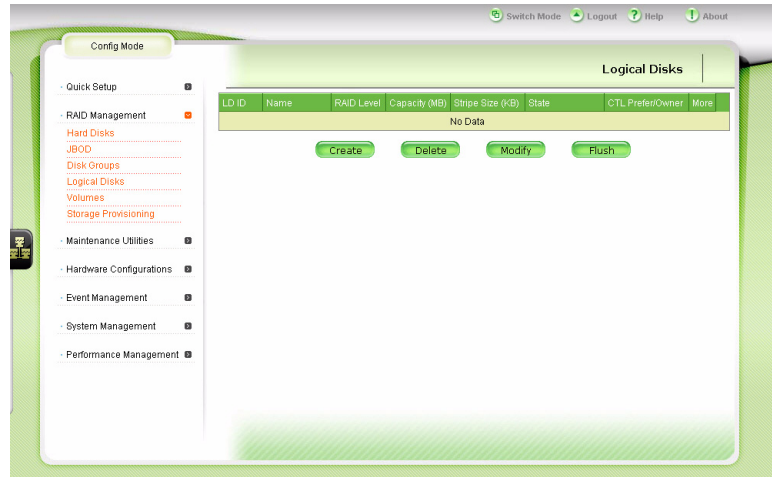
For example:

```
CLI>dgcreate dg0 hdd1 hdd2 hdd3 hdd4 hdd5 hdd6 hdd7 hdd8
CLI>dgcreate dg1 hdd9 hdd10 hdd11 hdd12 hdd13 hdd14 hdd15
hdd16
```

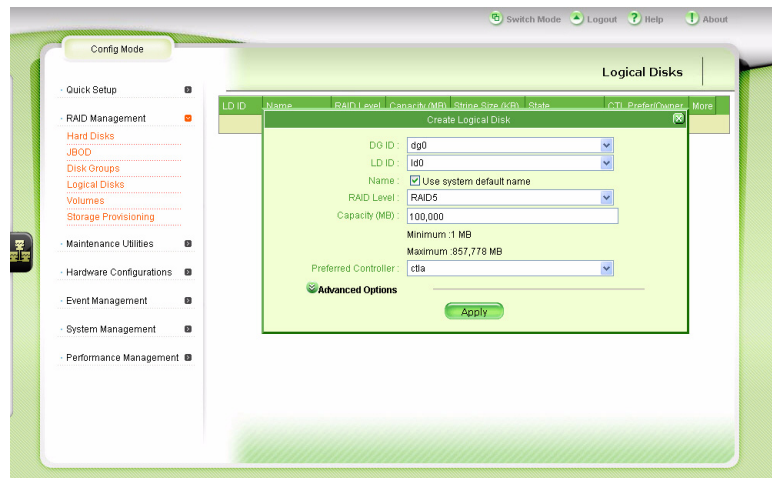
B. Create Logical Disks

By GUI

1. Click **Logical Disks** from the Config Mode menu. The following screen appears.

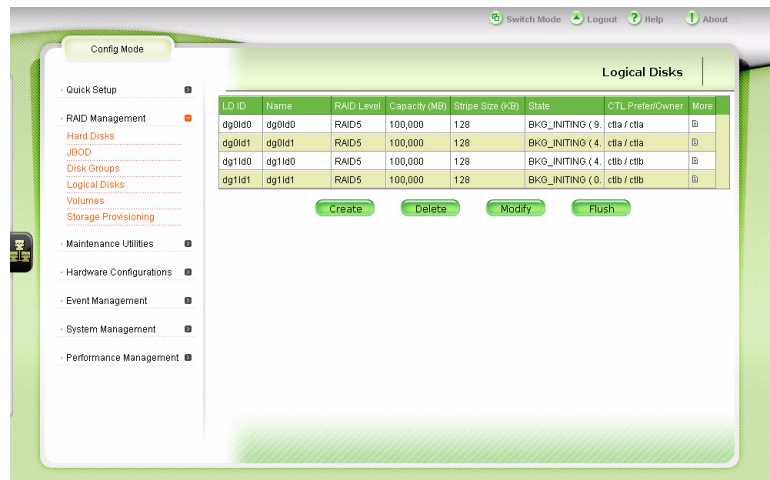


2. Click **Create** to open Create Logical Disk screen.



3. Select a **DG ID** from the drop-down menu. This is the disk group to be assigned for logical disk setting.
4. Select an **LD ID** from the drop-down menu.
5. Use the system default name as dgxldy. 'x' is the DG identifier and 'y' is the LD identifier. OR Uncheck the '**Use system default name**' box and enter the name in the Name field.
6. Select a RAID level for the logical disk. Different logical disks in a disk group can have different RAID levels. However, when NRAID is selected, there must be no non-NRAID logical disks in the same disk group.

7. Enter an appropriate capacity for the logical disk. This determines the number of sectors a logical disk can provide for data storage.
 8. Select the preferred controller to be in charge of managing and accessing the logical disk.
 9. Click **Apply** to start creating the logical disk.
 10. Repeat step 2 to 9 to create more logical disks.
- For example:



By CLI

1. At the CLI prompt type in: **hdlist all** to check the status of the hard disk.
2. Use the following command to create logical disk.

Command	ldcreate
Synopsis	ldcreate dgxldy capacity raidlevel [-s stripesize] [-i initopt] [-f x] [-o offset] [-n name] [-c ctlx]
Description	Create a logical disk
Parameters	capacity: logical disk capacity raidlevel: raid0, raid5, raid3, raid1, raid6, raid10, or nraid [-s stripesize]: stripe size [-i initopt]: initialization method [-f x]: free chunk [-o sector]: alignment offset [-n name]: the name of a logical disk [-c ctlx] (for redundant controller only): the preferred controller of a logical disk

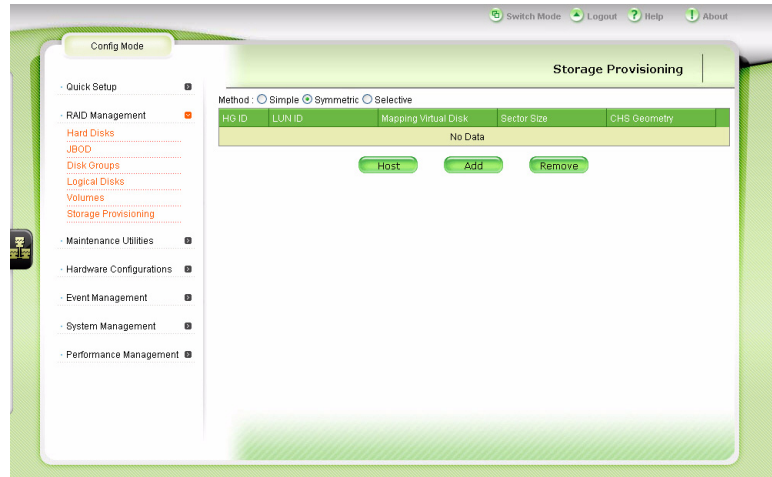
For example:

```
CLI>ldcreate dg0ld0 1000gb raid5 -s 128kb -i bkg -c ctla
CLI>ldcreate dg0ld1 1000gb raid5 -s 128kb -i bkg -c ctlb
CLI>ldcreate dg1ld0 1000gb raid5 -s 128kb -i bkg -c ctla
CLI>ldcreate dg0ld1 1000gb raid5 -s 128kb -i bkg -c ctlb
```

C. LUN Mapping

By GUI

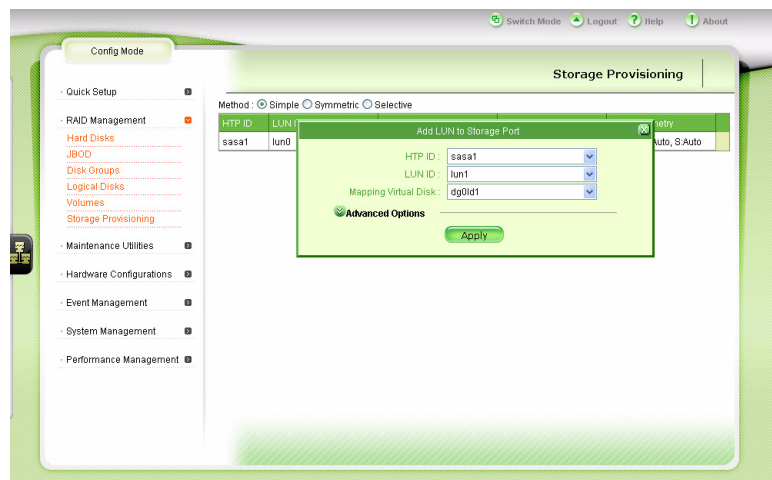
1. Click **Storage Provisioning** from the Config Mode menu. The following screen appears.



2. Click **Simple** method. The following confirmation message is displayed. Click **Confirm** to continue.

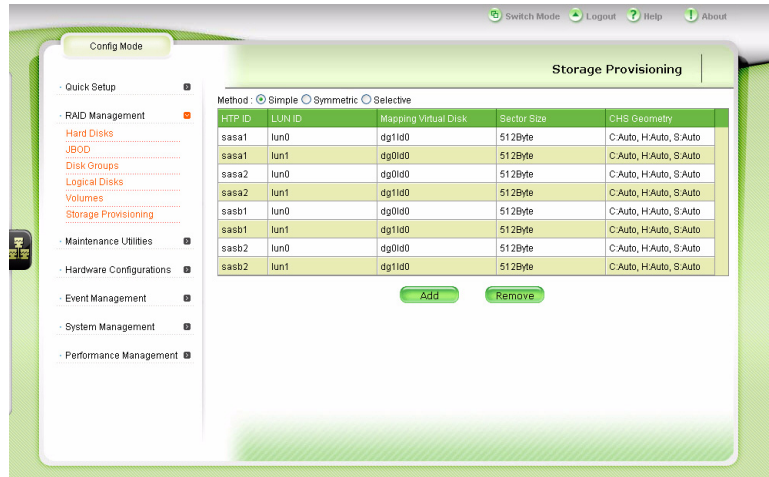


3. Click **Add** to open Add LUN to Storage Port screen.



4. Select a HTP ID from the drop-down menu.

5. Select a LUN ID from the drop-down menu.
6. Select a virtual disk from the drop-down menu for LUN mapping.
7. Click **Apply** to start LUN mapping.
8. Repeat steps 2 to 6 until you assigned all the disks.
For example:



9. Click RAID Management to see if the Mapping is correct.

By CLI

10. Use the following command to add a LUN ID to a virtual disk.

Command	htpaddlun
Synopsis	htpaddlun fcpx/sasx jbdy/dgylldz/voly/vvoly [-l lunz] [-s 512b/1kb/2kb/4kb] [-g cylinder head sector] [-w wt/wb] htpaddlun scpx jbdy/dgylldz/voly/vvoly [-i scsi_id] [-l lunz] [-s 512b/1kb/2kb/4kb] [-g cylinder head sector] [-w wt/wb]
Description	Add a LUN in a FC port with a virtual disk
Parameters	[-i scsi_id]: SCSI ID Refer to sgaddlun for other parameters.

For example:

```
CLI>htpaddlun fcpa1 dg1ld0
CLI>htpaddlun fcpa1 dg0ld0
CLI>htpaddlun fcpa2 dg1ld0
CLI>htpaddlun fcpa2 dg0ld0
CLI>htpaddlun fcpb1 dg1ld0
CLI>htpaddlun fcpb1 dg0ld0
CLI>htpaddlun fcpb2 dg1ld0
CLI>htpaddlun fcpb2 dg0ld0
```

11. Type **htplistlun all** to see if the Mapping is correct.

Symmetric storage

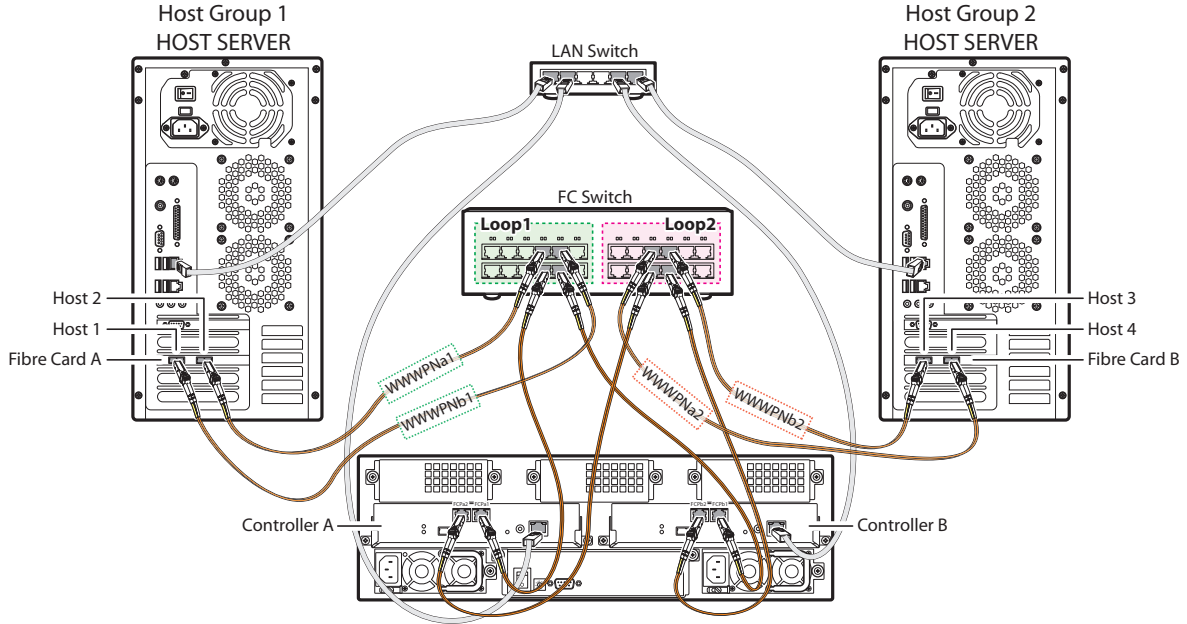
Symmetric storage is used in environments where hosts are equipped with multi-path IO (MPIO) driver or software that can handle multiple paths (LUNs) to a virtual disk.

(Host1) WWPNa1:0x1111111111111111

(Host2) WWPNa1:0x2222222222222222

(Host3) WWPNa2:0x3333333333333333

(Host4) WWPNa2:0x4444444444444444



Task List for Creating Small SAN

- A. Create Hosts
- B. Create Disk Groups
- C. Create Logical Disks
- D. LUN Mapping

A. Create Hosts

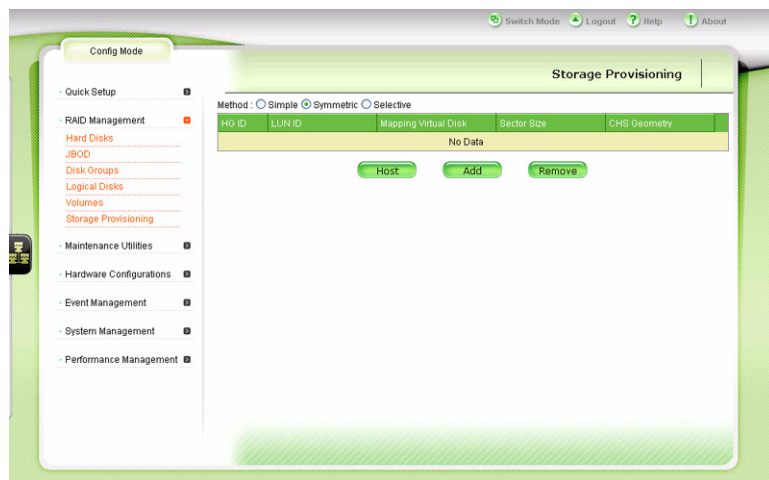
By GUI

1. Open a browser and enter the IP address in the address field. (The default IP address is 192.168.0.1)

The supported browsers are listed as below:

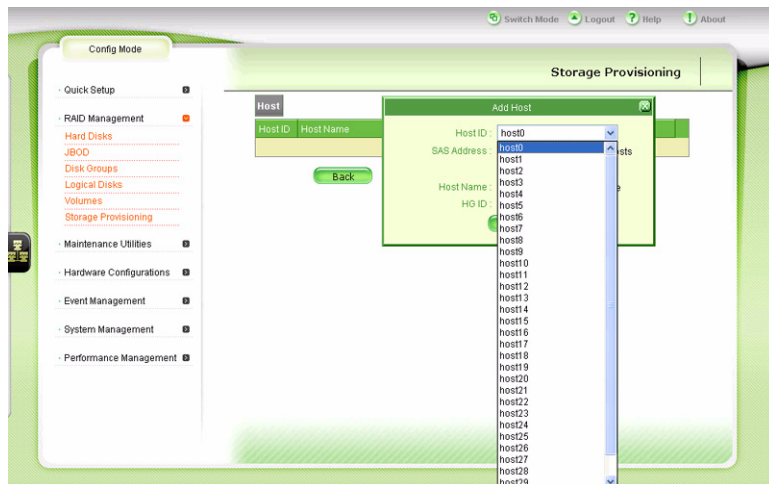
- IE 6.x (Windows)
- IE 7.x (Windows)
- FireFox 1.x (Windows, Linux, and Mac)
- Safari 1.x and 2.x (Mac)

2. To login, enter the username and password. The default username and password are "admin" and "0000". You can then access the Config Mode.
3. To make sure the hard disks are unused, click **RAID Management** from the Config Mode menu to check the status.
4. Click **Storage Provisioning** from the Config Mode menu to open submenu.



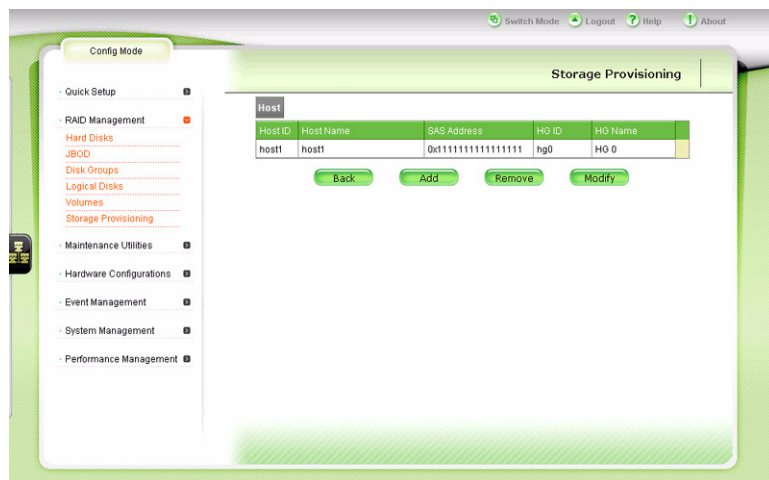
5. Select **Symmetric** method. The following confirmation message is displayed. Click **Confirm** to continue.
6. Click **Host > Add** to start creating hosts.

- Click **Host ID** and select a Host ID from the drop-down menu. A maximum of 32 hosts can be added to the controller.



- Choose each WWPN of Fiber HBA from the '**Choose from detected hosts**' box or directly enter the WWPN in this field. Each FC port needs a WWPN for communicating with other devices in an FC domain.
- Enter the **SAS address**. SAS Address is needed for communicating with other devices in an SAS domain.
- Enter the **Host name**. Use the system default name as hostx. 'x' is the Host identifier. OR Uncheck the 'Use system default name' box and enter the name in the Name field. The maximum name length is 63 bytes.
- Select a Host Group ID (**HG ID**) from the drop-down menu. You can select from hg0 to hg31 or No group. This setting is required for symmetric method.

For example:



- Repeat steps 6 to 11 to create more hosts.

BY CLI

Hosts can also be created from CLI.

1. Log on to CLI using the following information:

- User name: admin
- Password: 0000

2. At the CLI prompt type in: **hddlist all** to check the status of the hard disk and make sure they are unused.

3. Use the following command to create hosts.

Command	hostcreate
Synopsis	hostcreate hostx WWN [-n name]
Description	Create a host with WWN
Parameters	[-n name]: host name

For example:

```
CLI>hostcreate host1 1111111111111111
```

```
CLI>hostcreate host2 2222222222222222
```

```
CLI>hostcreate host3 3333333333333333
```

```
CLI>hostcreate host4 4444444444444444
```

4. Use the following command to create host groups.

Command	hgaddhost
Synopsis	hgaddhost hgx hostx hosty ...
Description	Add hosts to a host group

For example:

```
CLI>hgaddhost hg0 host1 host2
```

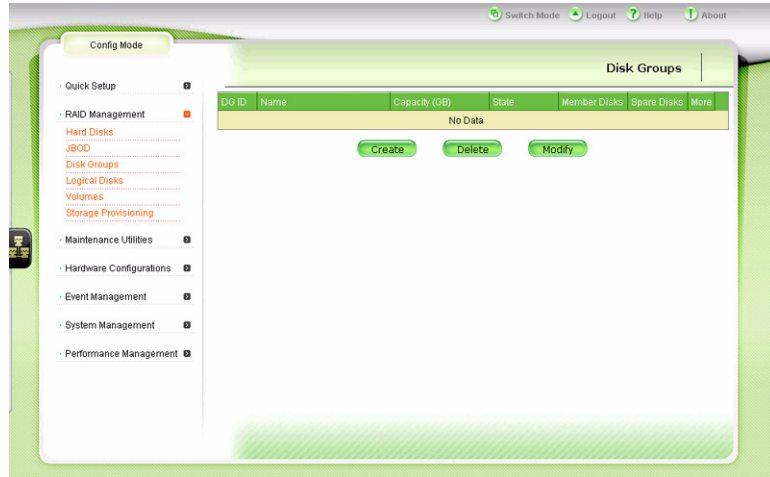
```
CLI>hgaddhost hg1 host3 host4
```

5. Type in **hostlist all** at CLI prompt to check the created hosts.

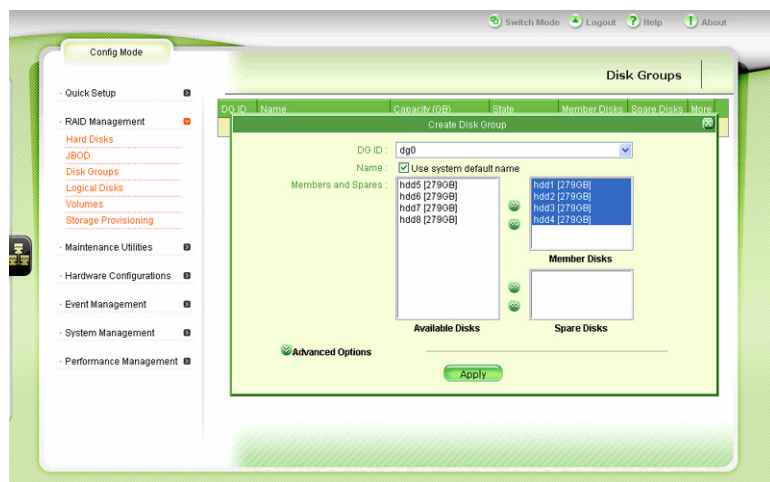
B. Create Disk Groups

By GUI

1. Click **Disk Groups** from the Config Mode menu. The following screen appears.



2. Click **Create** to open Create Disk Group screen.
3. Select a DG ID from the drop-down menu.
4. Use the system default name as dgx. 'x' is the DG identifier. Or Uncheck the '**Use system default name**' box and enter the name in the Name field. The maximum name length is 63 bytes.
5. Highlight the disks to be grouped in **Members and Spares** and click ➡ to move them to the **Member Disks**.



6. Click **Apply** to create the disk group.
7. Repeat steps 2 to 6 to create other disk groups.

By CLI

Disk Groups can also be created from CLI.

1. At the CLI prompt type in: **hddlist all** to check the status of the hard disk and make sure they are unused.
2. Use the following command to create Disk Groups.

Command	dgcreate
Synopsis	dgcreate dgi hddx hddy ... [-n name] [-i par/seq] [-z] [-s hddz,hdda, ...] [-t capacity]
Description	Create a disk group with member disks
Parameters	[-n name]: the name of a disk group [-i par/seq]: logical disk initialization mode (parallel or sequential) [-z]: write-zero immediately [-s hddz,hdda, ...]: local spare disks [-t capacity]: capacity to truncate

For example:

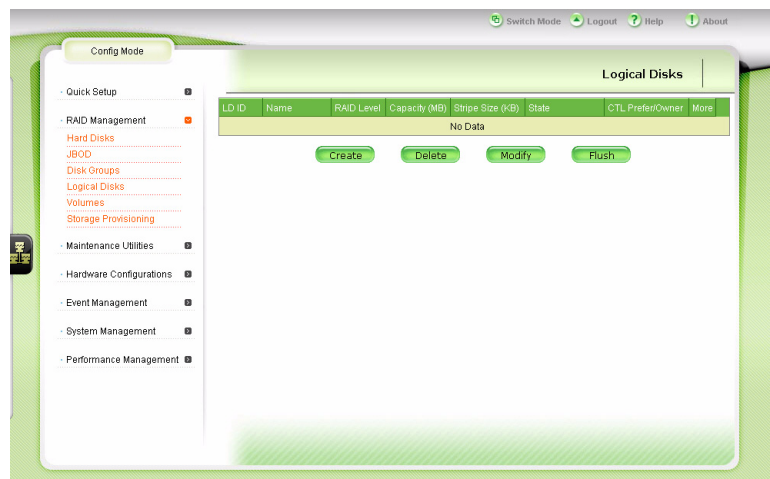
```
CLI>dgcreate dg0 hdd1 hdd2 hdd3 hdd4 hdd5 hdd6 hdd7 hdd8
```

```
CLI>dgcreate dg1 hdd9 hdd10 hdd11 hdd12 hdd13 hdd14 hdd15  
hdd16
```

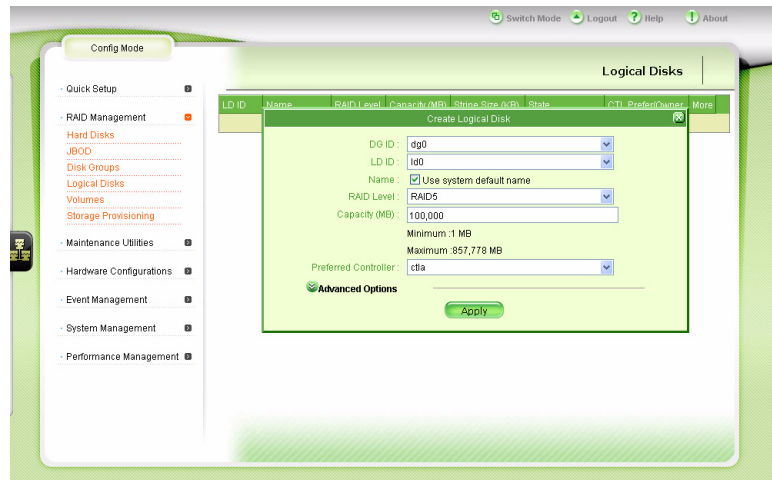
C. Create Logical Disks

By GUI

1. Click **Logical Disks** from the Config Mode menu. The following screen appears.

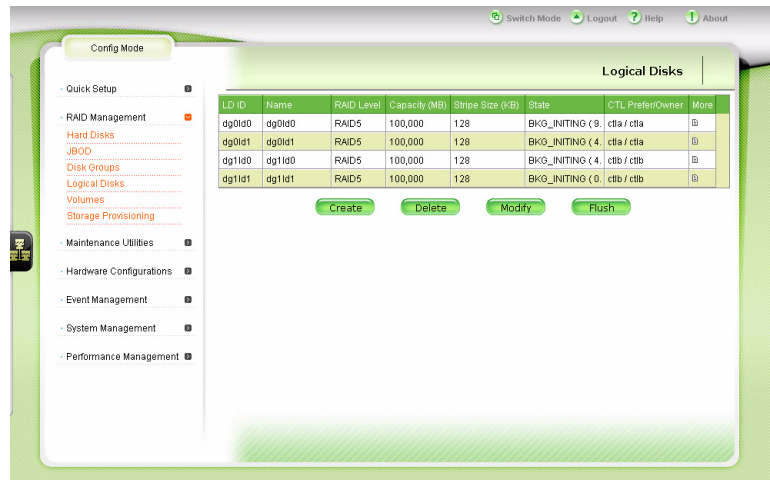


2. Click **Create** to open Create Logical Disk screen.



3. Select a DG ID from the drop-down menu. This is the disk group to be assigned for logical disk setting.
4. Select an LD ID from the drop-down menu.
5. Use the system default name as dgxldy. 'x' is the DG identifier and 'y' is the LD identifier. OR Uncheck the '**Use system default name**' box and enter the name in the Name field.
6. Select a RAID level for the logical disk. Different logical disks in a disk group can have different RAID levels. However, when NRAID is selected, there must be no non-NRAID logical disks in the same disk group.
7. Enter an appropriate capacity for the logical disk. This determines the number of sectors a logical disk can provide for data storage.
8. Select the preferred controller to be in charge of managing and accessing the logical disk.
9. Click **Apply** to start creating the logical disk.
10. Repeat steps 2 to 9 to create more logical disks.

For example:



By CLI

1. At the CLI prompt type in: **hdlist all** to check the status of the hard disk.
2. Use the following command to create logical disk.

Command	ldcreate
Synopsis	ldcreate dgxldy capacity raidlevel [-s stripesize] [-i initopt] [-f x] [-o offset] [-n name] [-c ctlx]
Description	Create a logical disk
Parameters	capacity: logical disk capacity raidlevel: raid0, raid5, raid3, raid1, raid6, raid10, or nraid [-s stripesize]: stripe size [-i initopt]: initialization method [-f x]: free chunk [-o sector]: alignment offset [-n name]: the name of a logical disk [-c ctlx] (for redundant controller only): the preferred controller of a logical disk

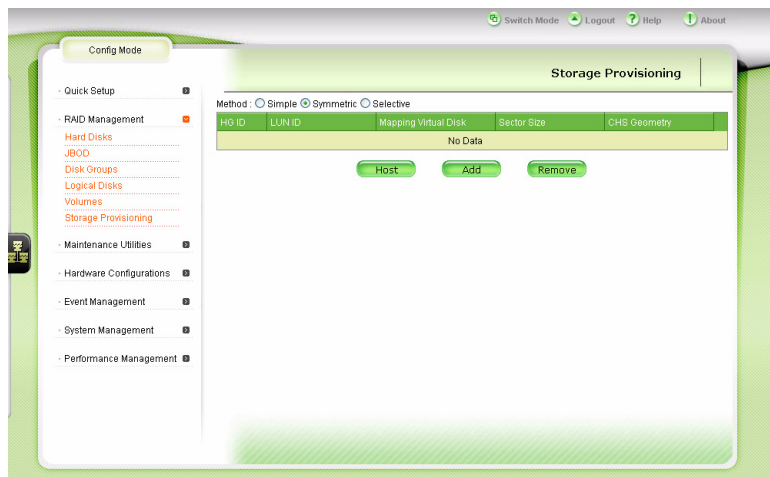
For example:

```
CLI>ldcreate dg0ld0 1000gb raid5 -s 128kb -i bkg -c ctla
CLI>ldcreate dg0ld1 1000gb raid5 -s 128kb -i bkg -c ctlb
CLI>ldcreate dg1ld0 1000gb raid5 -s 128kb -i bkg -c ctla
CLI>ldcreate dg0ld1 1000gb raid5 -s 128kb -i bkg -c ctlb
```

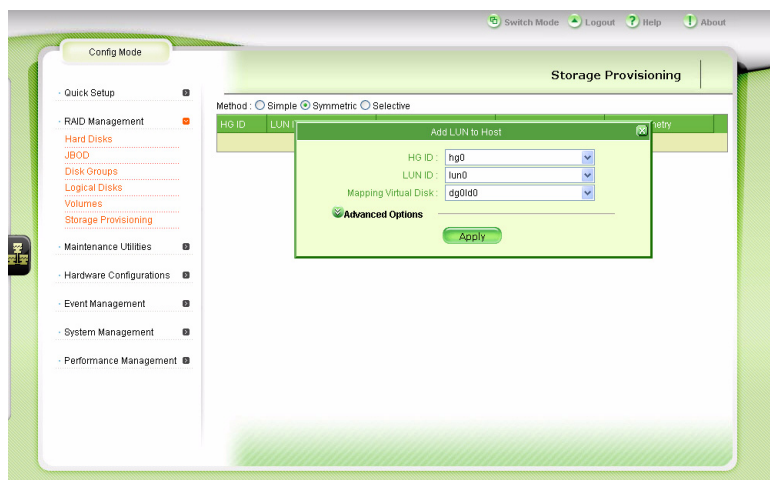
D. LUN Mapping

By GUI

1. Click **Storage Provisioning** from the Config Mode menu. The following screen appears.

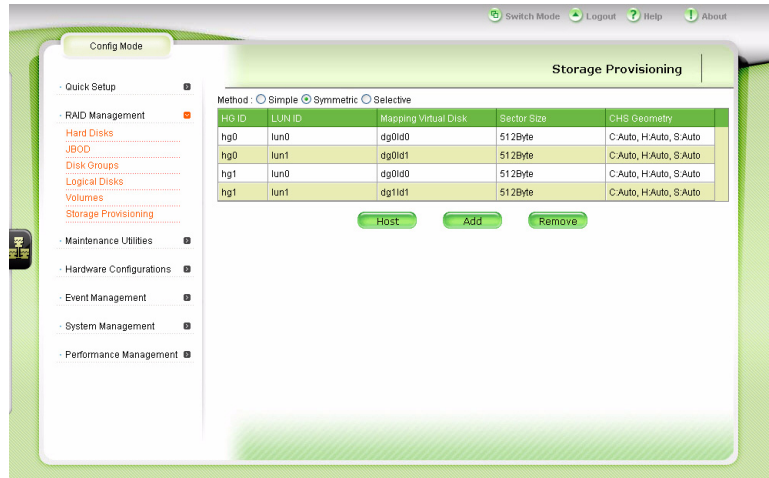


2. Click **Add** to open Add LUN to Host screen.



3. Select a Host Group ID from the drop-down menu.
4. Select a LUN ID from the drop-down menu.
5. Select a virtual disk from the drop-down menu for LUN mapping.
6. Click **Apply** to start LUN mapping.
7. Repeat steps 2 to 6 until you assigned all the disks.

8. Click RAID Management to see if the Mapping is correct.



By CLI

1. Use the following command to add a LUN ID to a virtual disk.

Command	hgaddlun
Synopsis	hgaddlun hgx jbdy/dgyl dz/voly/vvoly [-l lunz] [-s 512b/1kb/2kb/4kb] [-g cylinder head sector] [-w wt/wb]
Description	Add a LUN in a host group with a virtual disk
Parameters	Refer to sgaddlun for all parameters

For example:

```
CLI>hgaddlun hg0 dg0ld0
```

```
CLI>hgaddlun hg0 dg0ld1
```

```
CLI>hgaddlun hg1 dg1ld0
```

```
CLI>hgaddlun hg1 dg0ld1
```

2. Type **htplistlun all** to see if the Mapping is correct.

Step 8. Host Configuration

Windows Multi-Path Solution: PathGuard

PathGuard is the bundled multi-path IO solution for Windows platforms, and it is based on Microsoft Multipath I/O (MPIO) framework. PathGuard consists of MPIO drivers and a web-based path manager GUI that allows you to manage MPIO configurations for multiple host computers.

The MPIO drivers include standard drivers from Microsoft and DSM (Device Specific Module) provided by the RAID system supplier.

The following steps are required for enabling PathGuard MPIO:

1. Complete the hardware and software setup at RAID systems.
2. Install the PathGuard package to the host computer. Register the vendor name and model name of your RAID system to the PathGuard (optional).
3. Install the PathGuard MPIO driver.
4. Reboot the host computer.
5. Launch PathGuard GUI to set multi-path policies.

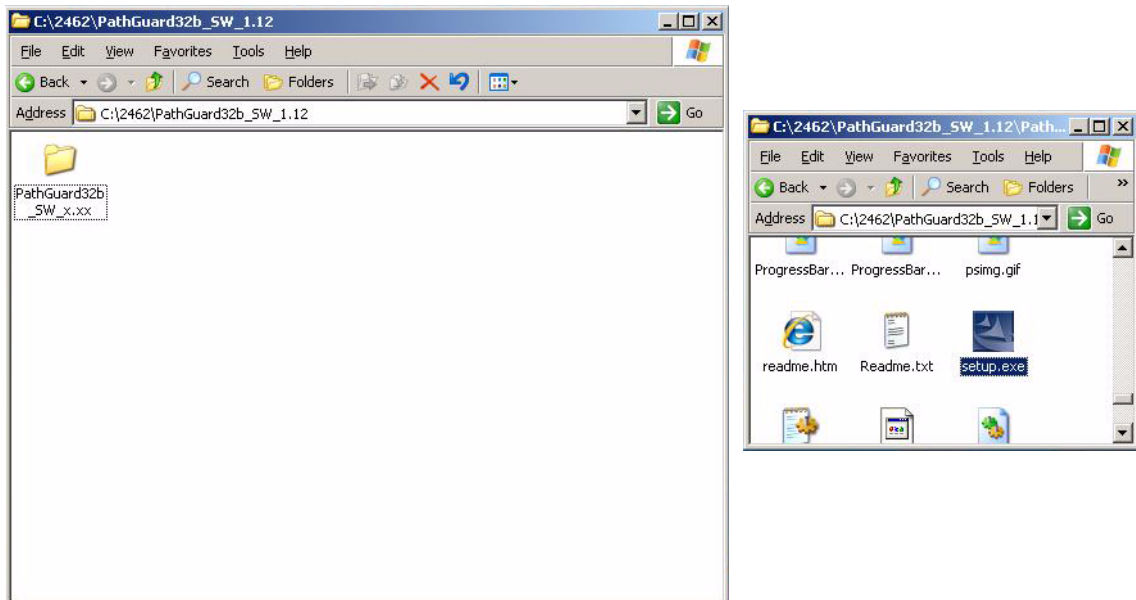
Windows MPIO framework requires rebooting the host computer when enabling the MPIO driver on the host computer, such that the regular disk device drivers will be replaced by the MPIO disk drivers.

Windows can properly detect multi-path disks only during MPIO driver installation, so reconfiguration (like adding/removing paths or LUNs) requires you to reinstall the PathGuard MPIO driver and reboot the host computer.

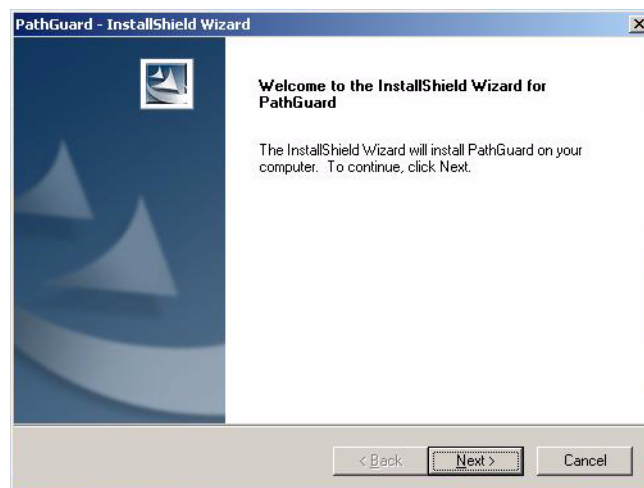
You might need also to manually rescan the physical drives (use **Computer Management > Storage > Disk Management**) When multi-path disks are not properly detected.

To Install PathGuard and MPIO Driver:

1. To install the PathGuard and MPIO Driver, double click the installation file on a host computer (choose the 32-bit or 64-bit installation file according to your host system).



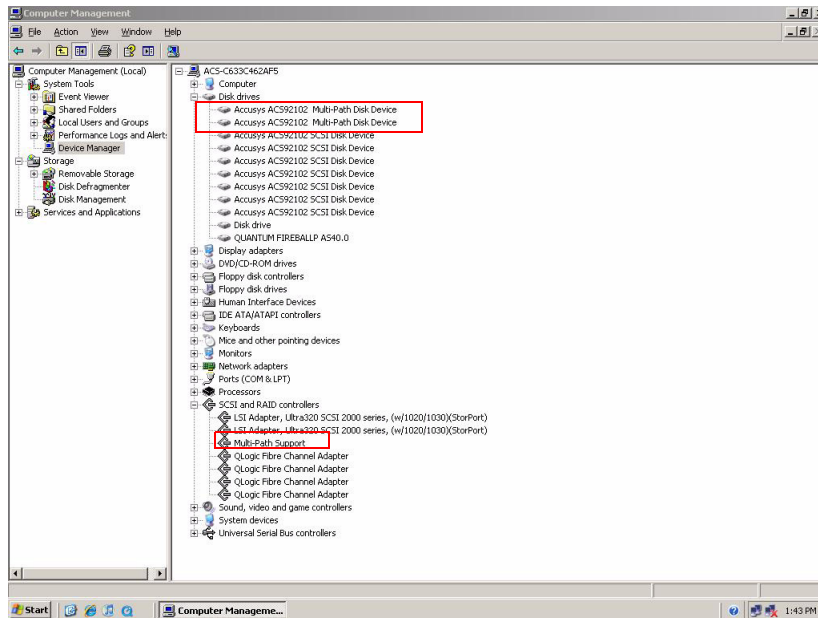
2. Follow the on-screen instructions to start the installation. PathGuard and the MPIO Driver will be installed automatically.



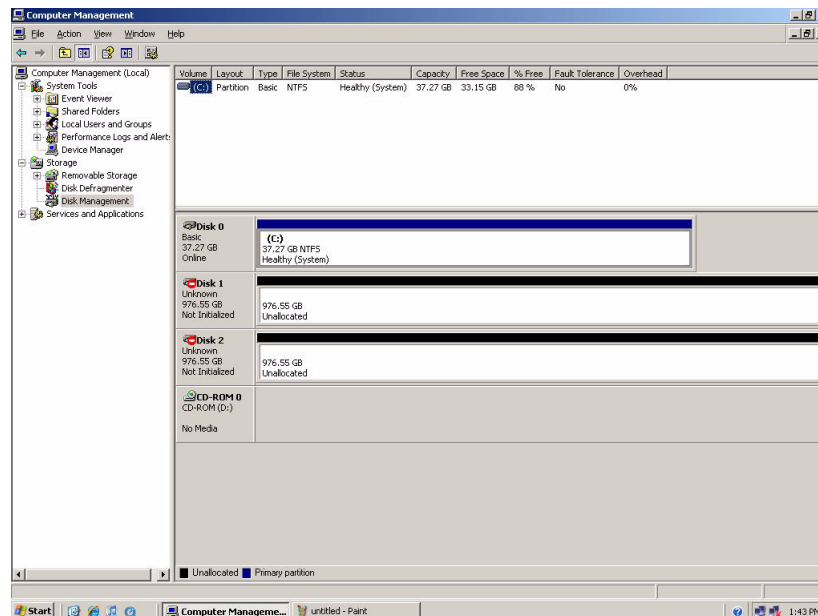
3. Reboot the host computer, and you have completed the installation. Check the MPIO disk status on the host computer

After the PathGuard and the MPIO Driver has been installed, you can find the new multi-path disk device(s) and the Multi-Path Support displayed in the following screen: **Computer Management > Device Manager**. (Right-click the My Computer icon on the desktop > select Manage)

1. Go to **Computer Management > Device Manager > Disk Drivers** and **SCSI and RAID controllers** to check for the Multi-Path Disk Device and Multi-Path Support. The following illustration shows a successful installation with Multi-Path Disk Device and Multi-Path Support found in the Device Manager.



2. Make sure the two installed disk devices are in the **Disk Management** as shown in the illustration. After that, you may format the new disk devices and start using them.



Trouble Shooting

General Guidelines

When you encounter issues, the most essential troubleshooting is to check the event log of your RAID system. In addition, you may need to check the system log of the operating system at your host computers.

Because there are a wide variety of hardware and software combinations, use the following checklist for problem determination:

- Check all cables to make sure they are connected properly.
- Check all hardware units are powered on and working properly.
- Check any recent changes in hardware, software, or configurations.
- Verify that the latest version of firmware and software are used.
- Verify that the latest version of BIOS and device driver of HBA are used.
- Verify that the operating systems, HBAs, switches, transceivers, and hard disks are in the compatibility list.
- Check how to reproduce the problems.

Before you call support, please collect the related information above to assist the support staff in identifying the problems. It is also required to acquire the following three log files:

- (1) RAID system user-level event log in human-readable form (.csv or .txt).
- (2) RAID system diagnostic-level event log (.bin).
- (3) the log file at operating system.

Beeper

When the Beeper Control is set to On, the system will turn on the beeper alarm if one of the following occurs. If the user mutes the beeper via CLI, LCD, or GUI, the system temporarily mutes the beeper until a new failure or error occurs.

- Voltage failure or error.
- Power supply failure or error.
- Fan failure or error.
- Temperature failure or error.
- BBM failure or error (when BBM is connected).
- Disk SMART warning.
- Disk bad block over threshold warning.
- Disk group with degraded logical disk and no disk for rebuilding.
- Disk group with faulty logical disks.
- UPS failure or error.
- Controller failure or removed.
- Dual controllers fail to boot up because of configuration conflict.
- Controller failback cannot proceed.

Solutions

See the table below for the solutions for the most common problems.

Problem	Cause	Solution
Hard disks cannot be recognized by the RAID controller.	If a hard disk cannot be ready within a specific period of time during the initialization, the RAID controller will force the hard disks enter faulty state and you cannot see any model information of hard disks.	To ensure hard disks have enough time for power-on, you may extend the delay time when boot-up of the RAID controller.
Hard disks are offline unexpectedly.	Internal component failure or reserved space for meta-data (RAID configurations) can not be written.	1. Use SMART check or DST (Device Self-Test) to test the hard disks in question. 2. Check the number of bad blocks and warning events reported by the RAID controller.
Exceptional hard disks behaviors.	Hardware is not setup properly.	Adjust hard disk settings such as: • Extend Disk I/O Timeout to accommodate slow disk operation. • Increase Disk I/O Retry Time to try I/O more times before giving up. • Reduce Transfer Speed to mitigate bad signal quality of disks. • Disable I/O Queue to avoid problematic NCQ support of disks. • Disable Disk Standby Mode to avoid problematic sleep support of disks. • Extend Disk Access Delay Time to allow longer time for disk spin-up.
Multiple hard disks are taken offline at a time.	Could be system-level problem. For example, if the hard disks in a JBOD system are offline unexpectedly, poor cabling in SAS or SAS expansion chain would also lead to unexpected hard disk offline. In addition, poor heat ventilation, unstable power supply, or hardware quality issues could also lead to offline of multiple hard disks.	Use array recovery utility to the RAID configurations. See the User's manual for more details.

The Web GUI can not be connected.	The management network interface is not configured properly.	Check if the LED indicators of the Ethernet port are lit up properly (refer to the hardware manual for details), and the IP address has to be set to enable the network interface. You can manually set the IP address by the LCD or local CLI, or use a DHCP server on the network.
The replacement controller stops boot-up with LCD messages.	Configuration conflict discovered by the system. The beeper alerts, and the LCD shows the following messages: (A) CONTR MOD UNEQ: the two controllers are of different model. (B) DB UNEQ: the two controllers have different daughter board. (C) PLD VERS UNEQ: the two controllers have different PLD version. (D) MEM SZ UNEQ: the two controllers install memory of different size. (E) BBM INSTL UNEQ: one controller has BBM, while the other has no BBM. If the conflict configuration can be resolved by overwriting the configuration of the replacement controller, the following LCD messages will be displayed and waiting for your confirmation by LCD ENT button: (F) CHK BC VERS: the two controllers have different boot code version. (G) CHK FW VERS: the two controllers have different firmware code version. (H) CHK BBM OPT: the two controllers have different BBM option. (I) CHK SN UNEQ: the two controllers belong to different enclosures.	(A/B/C) Contact your RAID system supplier to get the correct controller. (D/E) Install proper memory module and BBM. For (F) and (G), press the ENT button on the LCD to update the boot code and firmware code, respectively, and the replacement controller will reboot. For (H) and (I), press the ENT button to overwrite the BBM and enclosure serial number, and the replacement controller will continue boot-up.

Hard disk shows Unknown state.	The configurations on the hard disks cannot be recognized by the controller.	Erase the configuration information on the hard disks for your RAID system to use the hard disks.
Disk group enters degraded mode.	Member disks are not available.	Use the Array Recovery Utility to restore the disks to the degraded disk group. See User's manual for more details.
Hard disk shows Conflict state.	1. Cache unit size of the controller is bigger than the stripe size of the logical disk on the hard disks. 2. A disk group with the same disk group ID of the hard disks. 3. incompatible firmware version.	1. change the cache unit size. 2. use Array Roaming Utilities to import the hard disks to form a disk group with a new disk group ID. See the User's manual for more details. 3. erase the configuration information on the hard disks for your RAID system to use the hard disks. Or, contact your system supplier for solutions.

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